WHAT IS CLAIMED:

1. A method for providing a time varying gain time domain reflectometer (TDR) to display abnormalities of a copper pair line, comprising the steps of:

providing a time varying gain TDR;

transmitting from the TDR at least one pulse at a given pulse width into the copper pair line;

receiving a reflected pulse from the copper pair line;

measuring the elapsed time from the transmission of the pulse to the receipt of the reflected pulse corresponding to said transmitted pulse;

calculating the distance from the base location to an abnormality causing the reflected pulse;

piecewise gaining and biasing the reflected pulse of various gains to create a first normalized reflected trace which match the reflected traces within a predetermined observation range and thereby constitute a total smooth curve;

amplifying said first normalized reflected trace according to a function of time to create a second normalized reflected trace so as to eliminate an exponential gain decay curve of a no-fault copper pair line with the same predetermined characteristic parameters from said first normalized reflected trace to thereby obtain a second normalized reflected trace showing any amplified abnormalities; and

displaying at least one of the reflected trace, the first and second normalized traces corresponding to a predetermined observation range.

2. A method according to claim 1, whereby the step of amplifying said first normalized reflected trace includes a step of amplifying said first normalized reflected trace exponentially corresponding to the time interval.

3. A method according to claim 1, whereby the step of amplifying said first normalized reflected trace includes a step of amplifying said first normalized reflected trace with a gain corresponding substantially to the time interval, and a step of dividing over a first predetermined gain coefficient factor, whereby the first predetermined gain coefficient factor is determined according to at least one of the characteristic parameters including a wire gauge, length and temperature of the copper pair line.

4. A method according to claim 3, whereby the step of amplifying said first normalized reflected trace further includes a step of multiplying said first normalized reflected trace by a factor of 2.718.

5. A method according to claim 1 further comprising a step of offsetting a direct current portion from said second normalized reflected trace.

6. A method according to claim 5, whereby the step of offsetting said second normalized reflected trace includes a step of offsetting said second normalized reflected trace with a DC offsetting coefficient factor, whereby the DC offsetting coefficient factor is determined according to at least one of the characteristic parameters including a wire gauge, length and temperature of the copper pair line.

7. A method according to claim 1 further comprising a step of amplifying said second normalized reflected trace according to a function of time so as to create a third normalized reflected trace to further amplify the amplified abnormalities.

8. A method according to claim 7, whereby the step of amplifying said second normalized reflected trace is to amplify said second normalized reflected trace exponentially corresponding to the pulse width.

9. A method according to claim 7, whereby the step of amplifying said second normalized reflected trace includes a step of amplifying said second normalized reflected trace with a gain corresponding substantially to the pulse width, and a step of dividing over a second predetermined gain coefficient factor, whereby the second predetermined gain coefficient factor is determined according to at least one of the characteristic parameters including a wire gauge, length and temperature of the copper pair line.

10. A method according to claim 9, whereby the step of amplifying said second normalized reflected trace further includes a step of multiplying said second normalized reflected trace by a factor of 2.718.

11. A method according to claim 9, whereby the amplitude of said at least one trace of energy is proportional to an expected reflected pause from the copper pair line.

12. A method according to claim 1, whereby the abnormalities include opens, shorts, bridged-taps and wet section on the line.

13. A method according to claim 1, wherein the step of determining the cable gauge includes the automatic steps of:

(a) taking a predetermined number of horizontal samples along the cable to fill a horizontal length of a display screen;

(b) determining a value for a baseline ahead of the transmitted trace waveform;

(c) determining a preliminary initial value of the first horizontal sample on the following side of the transmitted trace waveform;

(d) selecting a decay slope from a plurality of predetermined decay slopes, based upon the preliminary initial value; and

(e) selecting a cable gauge by matching said decay slope one of a plurality of decay slopes in a look up table having different decay slopes based upon a variety of initial and wire gauges for various trace widths.

14. A method according to claim 1 further comprising the step of:

determining and discriminating the characteristics of the abnormalities on the wire by at least one of slope changes and widths of traces.

15. A method according to claim 14, wherein the step of determining and discriminating the characteristics of abnormalities on the wire further includes performing an abnormalities modeling analysis.

16. A method according to claim 14, wherein the step of determining and discriminating the characteristics of abnormalities on the wire includes comparing the normalized pluses with a plurality of normalized pluses associated with predetermined abnormalities.

17. A system for displaying abnormalities of a copper pair line, comprising at least one time varying gain time domain reflectometer (TDR) comprising:

supplying means for supplying at least one pulse of energy at a given pulse width on to a base location of the copper pair line;

receiving means for receiving the reflected pulse at the base location;

measuring means for measuring the elapsed time from the transmission of the pulse to the receipt of the reflected pulse corresponding to the transmitted pulse;

calculating means for calculating the distance from the base location to a abnormality causing the reflected pulse;

piecewise gaining and biasing means for piecewise gaining biasing the reflected pulse of various gains to create a first normalized reflected trace which match the reflected pulse of various gains within a predetermined observation range and constitute as one smooth curve;

a first time varying gain circuit for amplifying said first normalized reflected trace according to a function of time to create a second normalized reflected trace so as to eliminate an exponential gain decay curve of a no-fault copper pair line with the same predetermined characteristic parameters from said first normalized reflected trace to thereby obtain a second normalized reflected trace showing any amplified abnormalities; and

a display for displaying at least one of the reflected trace, the first and second normalized traces corresponding to a predetermined observation range.

18. A system according to claim 17, further comprising:

a second time varying gain circuit for amplifying said second normalized reflected trace according to a function of time to create a third normalized reflected trace so as to amplify the abnormalities thereby to differentiate different types of abnormalities.

19. A system for displaying abnormalities of a copper pair line, comprising:

supplying means for supplying at least one pulse of energy at a given pulse width on to a base location of the copper pair line;

receiving means for receiving the reflected pulse at the base location;

measuring means for measuring the elapsed time from the transmission of the pulse to the receipt of the reflected pulse corresponding to said transmitted pulse;

calculating means for calculating the distance from the base location to a abnormality causing the reflected pulse;

piecewise gaining and biasing means for piecewise gaining biasing the reflected pulse of various gains to create a first normalized reflected trace which match the reflected pulse of various gains within a predetermined observation range and constitute as one smooth curve;

a first time varying gain circuit for amplifying said first normalized reflected trace according to a function of time to create a second normalized reflected trace so as to eliminate an exponential gain decay curve of a no-fault copper pair line with the same predetermined characteristic parameters from said first normalized reflected trace to thereby obtain a second normalized reflected trace showing any amplified abnormalities; and

a display for displaying at least one of the reflected trace, the first and second normalized traces corresponding to a predetermined observation range.

20. A system according to claim 19, further comprising:

a second time varying gain circuit for amplifying said second normalized reflected trace according to a function of time to create a third normalized reflected trace so as to amplify the abnormalities thereby to differentiate different types of abnormalities.